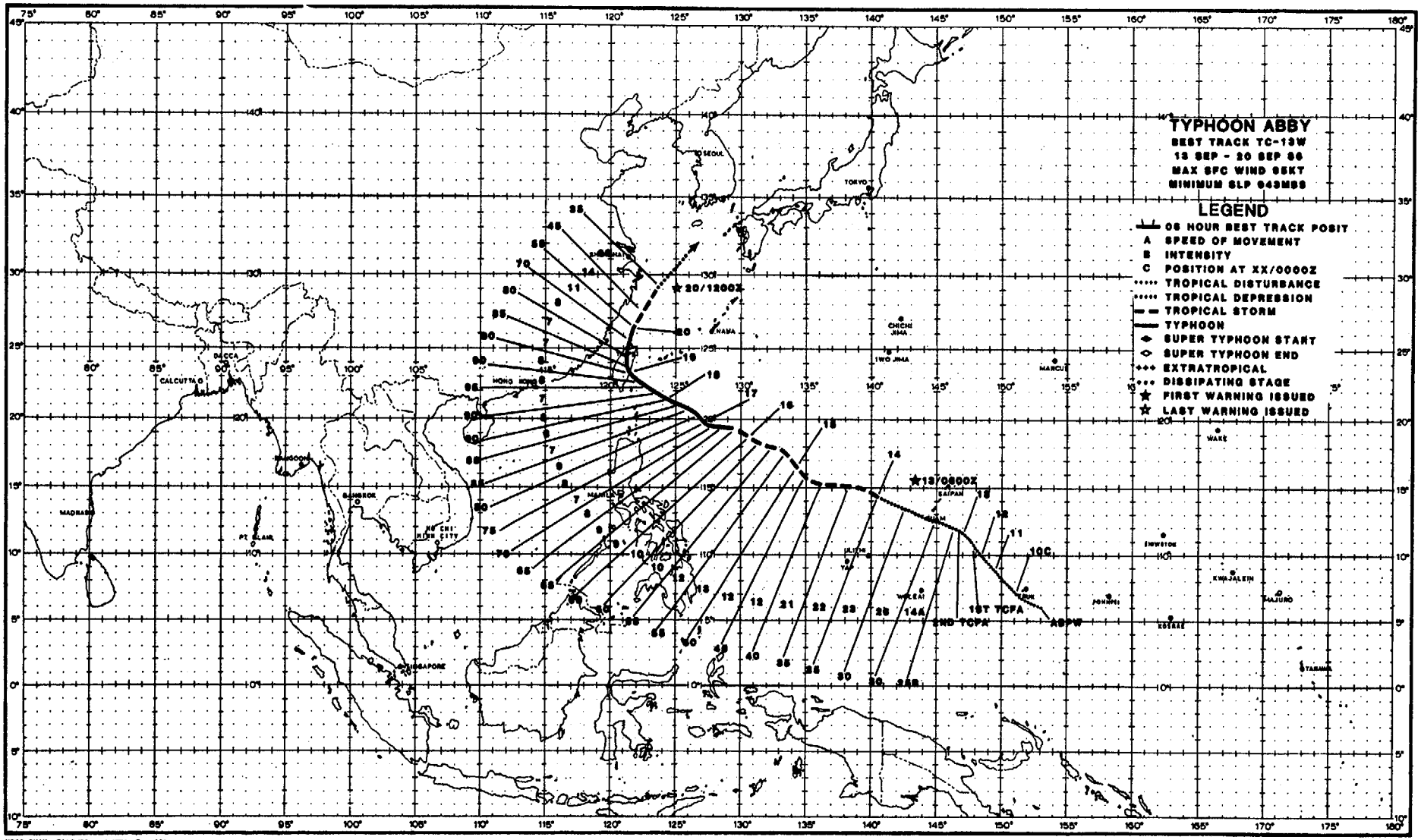

NOCC GUAM 3142/20 (NEW 5 - 80)

Typhoon Abby developed in low latitudes from a broad area of convection, moved northwestward and eventually recurved around the subtropical ridge. While in its formative stage, Abby gave indications that it might develop rapidly, however, it caused little, if any, damage when it passed within 30 nm (56 km) south-southwest of Guam. Later as a typhoon, it inflicted heavy damage and loss of life on the island of Taiwan.

During the end of August and beginning of September, the monsoon trough extended eastward from its normal position along 20 degrees North Latitude between 140 and 180 degrees East Longitude. This displacement, coupled with mean pressures two millibars below normal in the monsoon trough and higher than normal pressures to the south (in the Tasman Sea), resulted in stronger surface near-equatorial westerlies from New Guinea eastward into the Gilbert Islands. This increased low-level westerly flow, along with enhanced convection, raised the potential for tropical cyclone genesis within the monsoon trough. These factors, plus low vertical wind shear (Figure 3-13-1) associated with an area of persistent convection southwest of Truk, prompted mention on the 091930Z Significant Tropical Weather Advisory (ABPW PGTW). For three days this area of cloudiness continued to develop slowly as it drifted toward the northwest. Daylight aircraft reconnaissance on the 10th, 11th and 12th of September found only broad surface troughing, minimum sea-level pressures of 1006 mb and 20 to 25 kt (10 to 13 m/sec) surface winds.

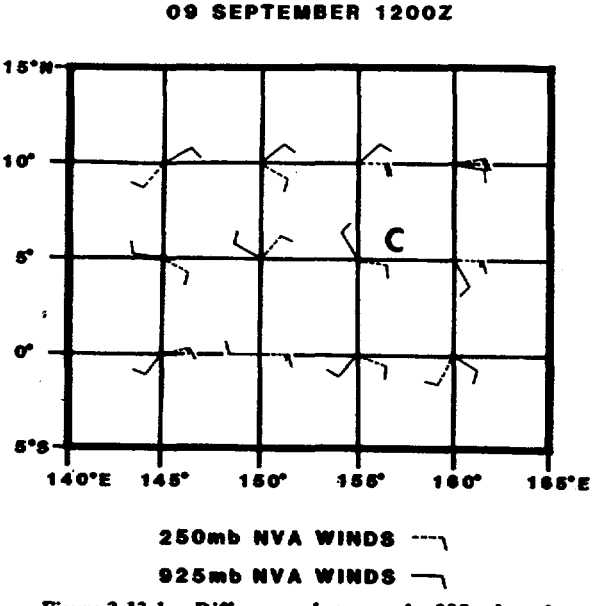

Figure 3-13-1. Differences between the 925 mb and 250 mb NVA winds on 091200Z September define an area of low vertical wind shear favorable for tropical cyclogenesis. Solid lines indicate 925 mb winds; dashed lines indicate 250 mb winds.

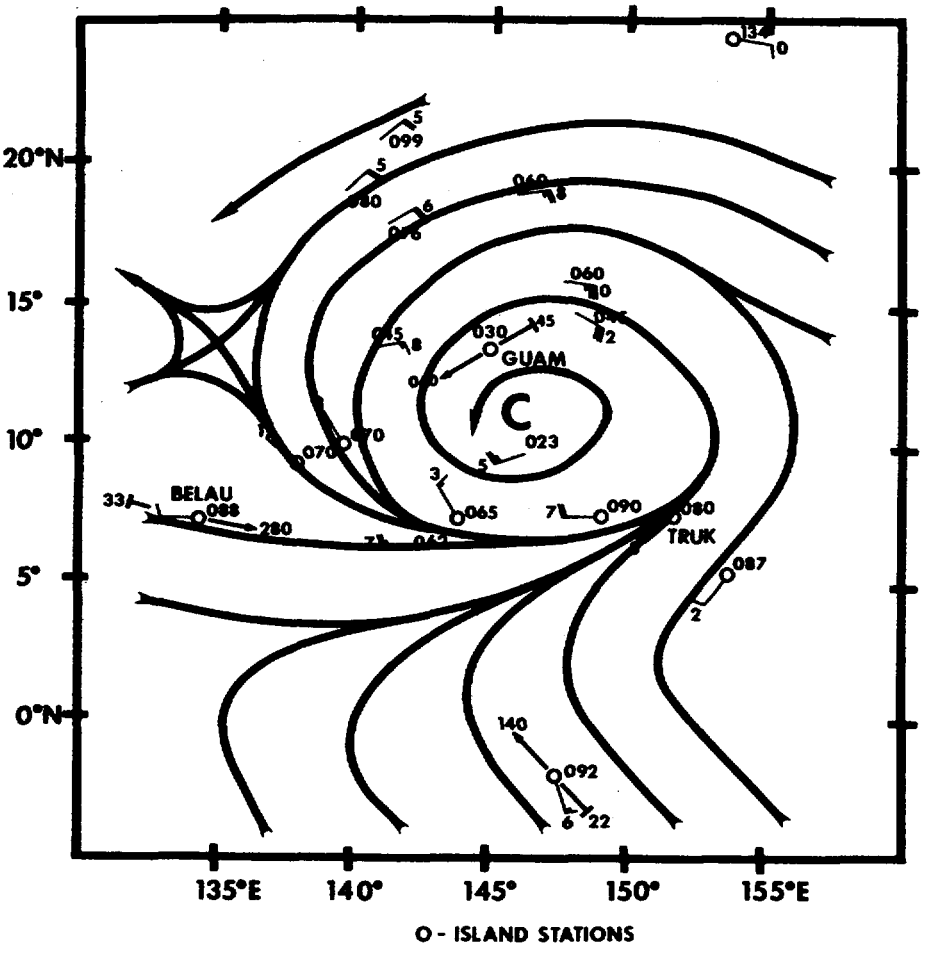

Figure 3-13-2. 130000Z September 1986 surface/ gradient-level streamline analysis showing synoptic reports which prompted the first warning on Typhoon Abby.

The 130000Z surface/gradient-level streamline analysis included one 35 kt (18 m/sec) ship report, one 30 kt (15 m/sec) ship report, one 33 kt (17 m/sec) gradient-level wind report and indicated that a minimum sea-level pressure of 1002 mb was associated with the system (Figure 3-13-2). Based on this information, the first warning was issued at 130600Z, which located Tropical Depression 13W 120 nm (222 km) southeast of Guam. During this early period, Abby was a large disturbance, which lacked a persistent central dense overcast (CDO) (Figure 3-13-3). Beginning at 140600Z, however, Abby began to develop its CDO. Twelve to eighteen hours later, when the CDO feature became firmly established, Abby slowed its forward motion and intensified. As a point of interest, the band of maximum flight-level winds was displaced 70 to 120 nm (130 to 222 km) from the 700 mb center on 16 September (Figure 3-13-4).

Abby reached its maximum intensity of 95 kt (49 m/sec) at 181200Z. Twelve hours later, it swept past the east central portion of Taiwan (Figure 3-13-5) with 90 kt (46 m/sec) surface winds and torrential rains. As a result, 13 people were killed; crop and property damage were estimated at 81 million dollars.

Typhoon Abby decreased significantly in intensity following its collision with Taiwan. The upper-level circulation traveled across the island while the low-level circulation moved up the island's east coast. Without the upper-level circulation and supporting convection, the low-level vortex weakened and accelerated toward the north-northeast. At 201200Z, the final warning was issued on Abby as it dissipated over the East China Sea.

In retrospect, as Abby approached Taiwan and recurved there were some data collection problems. Aircraft reconnaissance data to support warnings was limited due to reduced aircraft availability, the proximity of the no-fly line and the rugged island topography. Determining the initial position of Abby was complicated as a result.

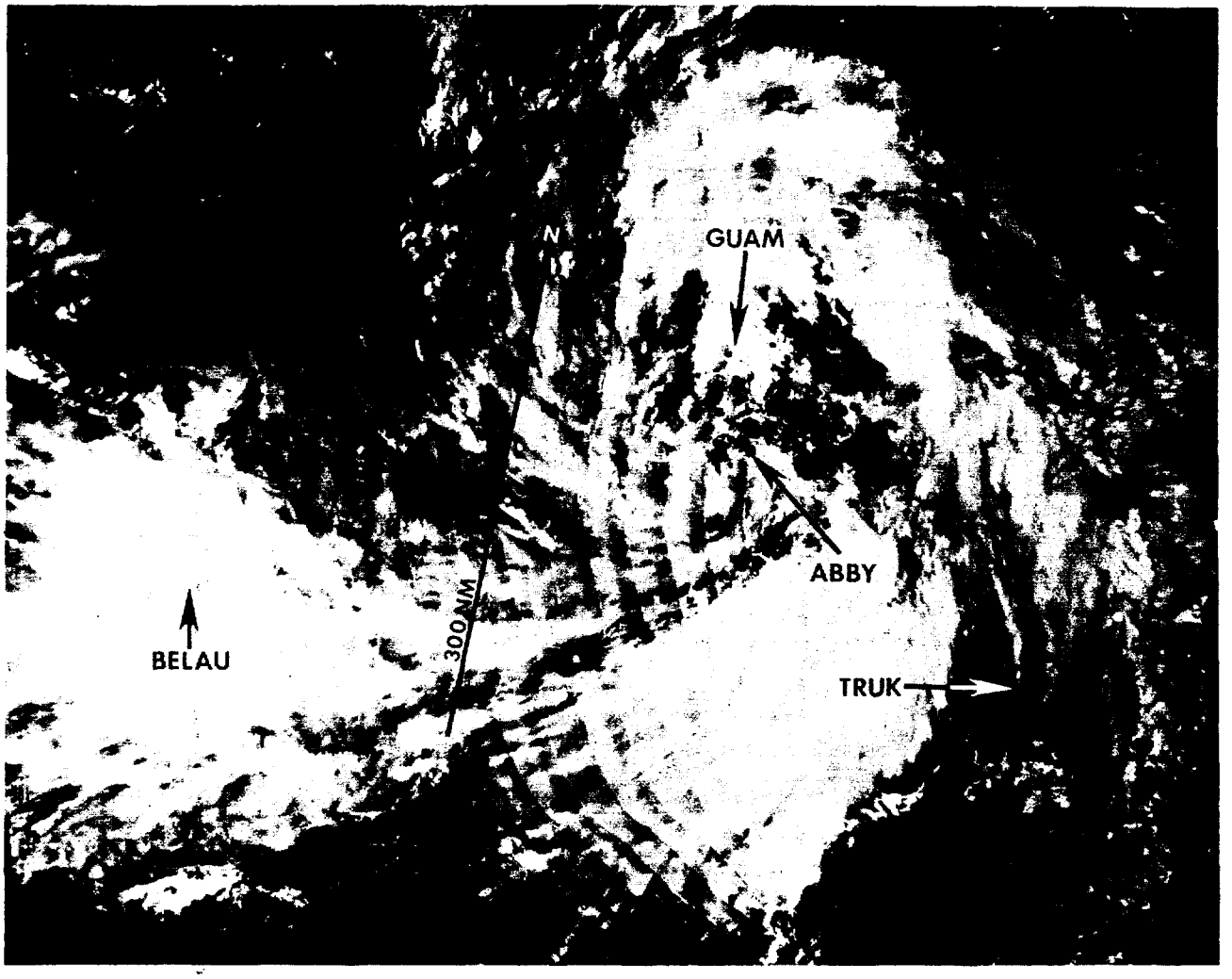

Figure 3-13-3. Tropical Depression 13W without a persistent central dense overcast (130508Z September NOAA visual imagery). The wavy lines in the imagery are due to temporary problems with the tactical sites processing equipment.

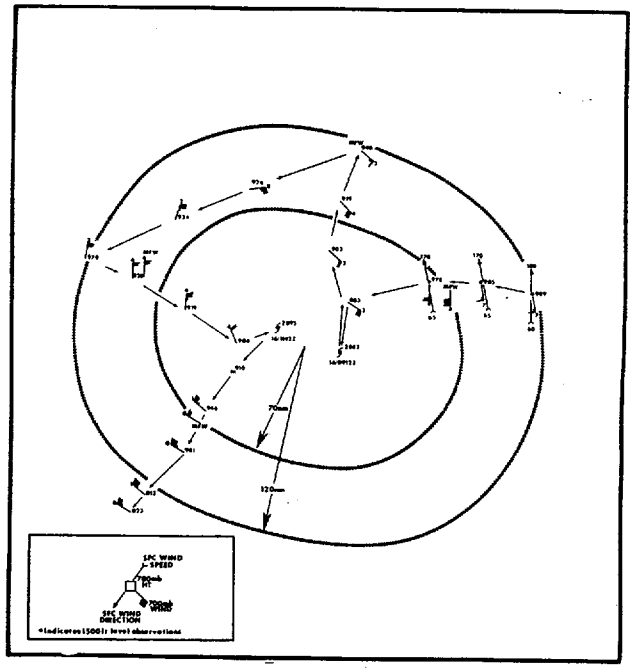

Figure 3-13-4. In-flight 700 mb winds from aircraft reconnaissance on 16 September 1986. Note the stronger winds are displaced outward from the center in a band by approximately 70 to 120 nm (130 to 222 km).

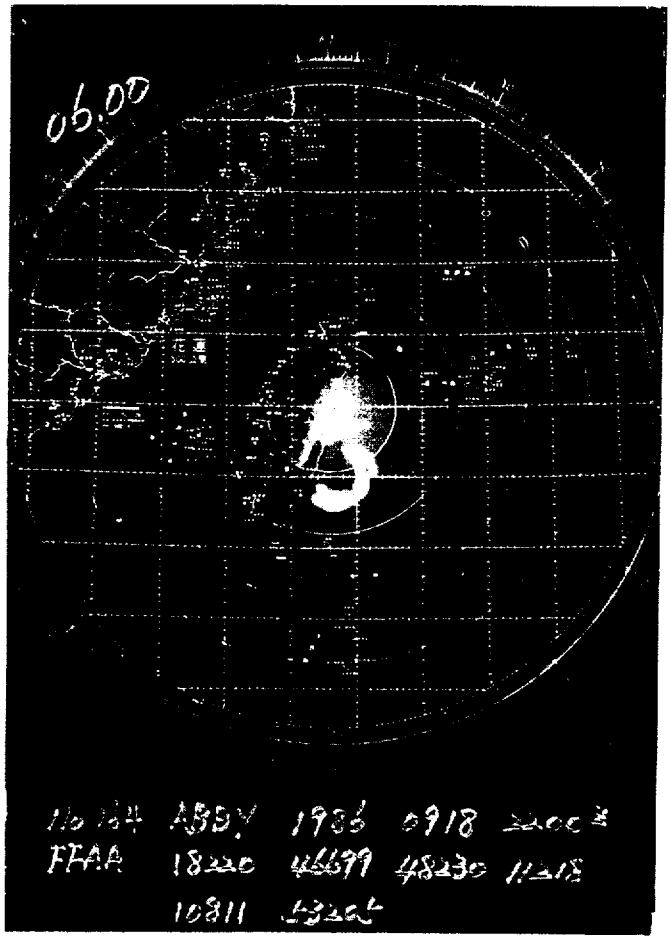

Figure 3-13-5. Radar view of Typhoon Abby as it approaches eastern Taiwan, 182300Z September (Hualien, Taiwan (WMO 46699)).